

NEPALESE CONCERN ON ECOSYSTEM TO REGULATE HIGHLAND LOWLAND INTERACTIVE LINKAGES: REGIONAL EFFORT MAY BE BOTH ASSIMILATIVE AND PRODUCTIVE

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Introduction: Interaction of land activities in the water bodies making way ultimately to the sea, is the main context prescribed as the guideline to the Seventh Stockholm Water Symposium and Third International Conference. Asia referable for marginal land, population pressure, poverty, hunger, malnutrition and environmental degradation, may be looked into, in such a context, with serious concern on the ecosystems in linking the activities of the highland and the lowland prevailing under various phases of culture - primitive to industrial, with a sense of urgency to correlate land activities at variable eco-provinces in sustainable manner along the course of the river systems gradually merging to the sea coast.

The rise of the Himalaya established present features of Asia with peculiar mountain configurations *and new order of the* (Indus/Brahmaputra, Salween/Mekong, Yangtze/Hwang Ho) *River Systems* from the highland to the sea coast. The glaciers of the successive Ice Ages and the incoming Monsoon fed by the Indian and Pacific Oceans enshaped the *morphological features* of the highland and lowland terrain through incessant weathering and periodic cycle of sedimentation bringing forth *ecological niches* and *biospheric provinces* to which Man entered as an active member since his emergence. Archaeological records do testify that his successive cultural growth has been centred to selective eco-provinces and *wetlands* for nourishing himself and perpetuating his race. His activities from the early phases has been hunting, clearing the forest for agriculture and grazing to raise his livestock as practised today as well around the lake provinces of Kunlun Shan, in the terrain of Pamir Tian Shan, Szechwan highlands and in the southern slopes of the Himalayas. The steppe terrain of Afghanistan and the expanding Thar desert transformed from the luxuriant forests of the past ages, are unique examples of *ecological reverses* and serious repercussions of human activities when unchecked in time in consideration of holistic resource management.

Enumerable problems: Population growth, need of increase on land productivity, expanding urbanization, industrial enterprises, trade network and developmental projects related to economic growth, progressively enlarge the nature and magnitude of land activities adding stressful pressures on the fragile and scanty resources at variable points from the source of the river to the sea. The problems emerging are:

- The highland is mostly degraded due to forest clearance, shifting cultivation, heavy grazing resulting drought/flood and sedimentation of the productive land in the lower course of the river system;
- Extensive forests of the lowland and wetlands have been encroached upon to get over agricultural needs. All these have destroyed natural vegetation and ecological diversities;
- Irrigational projects, hydro-power establishments and road constructions have become the avenues of *ecological degradation*;
- Industrial establishments and urban centres are polluting the rivers and the wetlands;
- Eco-friendly formulae to feed the basic needs of the *highland population* as well as to the *enclaves of the tribes* resorting to primitive practices, need to be worked out;
- Institutional nuclei at various levels are needed to be set in action for resource management: *users' groups at the community level remain potential to act*;
- Gap in environmental awareness, paucity of information related to resource management and need of collaborative undertakings at the *grass root level*;
- Negligence to long range perspective and decisions guided by the motive of quick profit without much home work;
- Need of investigational researches identifying the major problems being confronted in consultation with the field-oriented people; and collaborative undertakings by the private sector addressing socio-economic and sustainable issues.

Measures undertaken: In view of the important interlinkages of the state of eco-belts of the highland and lowland, areas have been delineated for protection:

- The wetlands and ecological provinces of the Pamir, Tien Shan, Altay, Kunlun Mountains and highlands of Hindukush, Himalayas and Szechwan. It may as well be noted that *Longbao marsh* (Tibet), marshes and swamps of Hengduan Mt and *Wanglang Nature Reserve* (Szechwan) feed the Yangtze River. *Xishuangbanna Natural Reserve* (Szechwan) fed by the monsoon of Indian and Pacific Ocean lies in the Mekong River Basin and is important for Laos, Myanmar and Vietnam in ecological consideration. The Himalayan Sanctuaries and the National Parks feed the Indus, Ganga and Brahmaputra Systems. Out of these Kedarnath Sanctuary, Nanda Devi, Langtang, Sagarmatha, and Makalu-Barun National Parks and Jigme Dorji wildlife sanctuaries are notable. The two reserves of Arakan Yoma (*Tanlwe Ma-e Chaung* and *Taungup Pass Sandoway Chaung*) are large and biologically important. The proposed *Pegu Yoma Nat. Park* (largest and valuable block of teak forest), *Kabo Kazi Reserve* (highest peak) and *Nam Lang Valley Reserves* (Sub-tropical montane forests) and the large *Tamanthi reserve* (northern semi-evergreen forest) are notable.
- In the Ganga Brahmaputra plain Corbatt National Park, Shuklaphanta and Chitwan Nat. Park, Kaziranga, Manas and various Sundarban reserves and mangrove swamps are notable.
- In the large plain and valleys of the Mekong and Chao Phraya rivers extending up into the Himalayan foot hills, the great lake of *Tonle Sap* (Kampuchea) with its surrounding seasonal swamp forest is one of the most productive inland fisheries in the world. It is the most significant wetland in South East Asia. This province contains gorges, waterfalls, limestone Karst that should be included within the protected area network. Proposals have been made to protect fresh water swamp, sub-alpine habitat, sub-montane dry evergreen forest and tropical montane deciduous forest: *Phnom Aural Reserve* (habitat in the Cardamon mountain) in Kampuchea, *Nam Cat Tien Nat. Park* (lowland forest) and *Dalat highland reserve* in Vietnam as well as *Khao Yai Nat. Park*, *Kaeng Krachan* and *Kho Soi Dao protected reserve* in Thailand are notable.

In Nepal Man and Biosphere Programme was initiated in 1974; thereafter, ecological studies of the Nepalese terrain, water supply and sanitation study and watershed management programmes were undertaken to apply corrective measures in resource management. Efforts of impregnating environmental elements in the plan formulations, working out of the National Conservation Strategy, Forestry Master Plan, Environmental Policy and Action Plan, Natural Resource Management for Sustainable Development and EIAs are recordable. The need of appropriate institution to regulate intersectoral undertakings was felt decades ago at the policy level. Such responsibilities were bestowed upon partially on the existing institutions: say in Forestry, Watershed Management, National Planning Commission; and later, **Environment Protection Council** as well as the **Ministry of Population and Environment** have been commissioned for implementational undertakings. Water and Energy Commission affiliated to the Ministry of Water and Power, is profitably engaged in investigative undertakings, and researches connected with water power, river training and environmental issues. However, vacillative attitude appearing periodically tend to erode the credibility of the institutions commissioned for environmental undertakings.

Macro-ecoprovince: The need of cooperative undertaking at the regional level was realised in the early 1975s and following that effortful exercises were undertaken to host the International Centre for Integrated Mountain Development (ICIMOD); support and inputs extended to the South Asia Cooperative Environment Programme (SACEP), and South Asian Association for Regional Cooperation (SAARC) are as well notable. The principles enunciated at the *Earth Summit* (Rio de Janeiro, 1992) and the Nepalese national exercises thereafter, adhere to the *concept of macro-ecoprovince* requiring attention on the maintenance of biospheric networks with the central theme of man's primary interest in sustainable context. Thoughts emerging in dynamic continuity focus on the correlative inter-relationship of national programme with the regional objectives committed for resource conservation. Furthermore, obligatory commitments of the nations located within the macro eco-province, are to be reiterated to achieve sustainable targets set through inter-dependence and collaborative undertakings exercising wide vision. This has been firmly realised and expressed in the Nepalese frontier.

Implementational record: The watershed management exercises are in operation towards enhancing water potentialities and initiating resource management at the community level through the users' group. Private plantations and income generating exercises are being followed up but due to weak institutional setting wherein there is paucity of internal resource and bold decision making, enthusiasm for effortful undertaking is not perceptible. The policy on decentralisation supported by specific legislation has not been much effective as the institutional functioning is yet based on the *feudal culture* which remains strongly resistant to share the authority. Environment Impact Assessment has been recorded as the major pre-requisite in planning and executing hydropower projects, industrial establishments as well as in urban management, water supply/sanitation and solid waste disposal. The state of achievement at present warrants critical examination of highland lowland interactive linkages, man's exercised *role as a biospheric member* in minimising ecological imbalances, institutional role in researches and implementation, and *introspective exercises* to establish correlative linkages applicable between national, regional and international programmes in a given time-bound schedule.

Adjustment of Man's partnership: In a regional perspective the highland lowland profile of the Indus, Ganga, Brahmaputra, Irrawady, Salween and Mekong may be reviewed upon periodically at convenient intervals to rehabilitate ecological provinces through adjustment of Man's partnership with Nature to ensure protection of wetlands and meadows, regulate watershed management through the grassroot echelons and maintain hydrologic regime in sustainable order. Coordinated undertakings are needed in the management around: i) Hindukush - Pamir - Tien Shan; ii) Tibetan plateau and Himalayan Highland; iii) Himalayan/Szechwan provinces feeding major systems of Salween, Mekong and Yangtze; iv) Extensive frontiers of slopy terrain of the Hindukush Himalaya encompassing all the major river basins; v) Lowland forest, meadows, swamps extending to the sea coast.

Mohingyi reserve (fresh water swamp habitat) and *Meinmahla Kyun* (mangrove) reserve have been proposed in the Irrawady delta; apart from that a national plan for valuable *teak forest* has been realised as the urgent need in Burma. *Tenasserim hills* including montane forest has been deemed as a major reserve; and the area adjacent to the *Thung Yai* (Thai reserve) is being suggested as a trans-frontier reserve. Extensive parts of Mekong delta comprising mangroves, fresh water swamp feed *Melaleuca peat swamp forests*. Extension and management of Nam Cat Tien National Park has been proposed to perpetuate illustrative example of lowland forest in Vietnam. Establishment of Phnom Aural Reserve is set as high priority in Kampuchea. There is a tripartite agreement between Vietnam, Laos and Kampuchea for cooperative undertakings on conservation issues.

Multi-sectoral researches: The resource base of Asia is referable to the highlands encompassed by the Pamir region, Kunlun Shan, Heng Duan Shan and the Great Himalayan configuration. Setting up an equipped **Centre** for such a region known as the *roof of the world* for integrated and multi-sectoral researches, will be blissful in terms of: i) land atmospheric interaction revealing basic understanding of *climate dynamics*; ii) determination of the energy and water balance of high altitude lakes; iii) forecasting of *melt water* contribution from snow and ice to stream flow; iv) measurement of the rates of erosion and siltation; v) evaluation of the rate of *mountain uplift* and associated *seismicity*; vi) characteristics of floral and faunal distribution and their *ecological/hydrological inter-relationship*; and, vii) understanding various atmospheric processes in operation which may be having variably major influences on *monsoonal circulation*. The regional bodies mainly the International Centre for Integrated Mountain Development may be deemed to having obligatory commitment in organising such programmes referable to national, regional and international significance.